

**WHAT IS CLAIMED IS:**

1. An information communication system, comprising:  
a plurality of information communication devices,  
wherein each of the plurality of information communication devices is  
5 responsive to a respective information communication clock signal, and  
wherein each information communication clock signal of each of the  
plurality of information communication devices is associated with a common  
reference clock signal; and  
a phase controller,  
10 wherein the phase controller is responsive to the common reference  
clock signal, and  
wherein the phase controller alters a phase of each information  
communication clock signal of each of the plurality of information communication  
devices by a predetermined amount.  
15
2. The information communication system of claim 1, wherein each of  
the plurality of information communication devices is responsive to the common  
reference clock signal altered by the phase controller, and  
wherein each of the plurality of information communication devices  
20 comprises:  
a device clock for generating the respective information  
communication clock signal using the common reference clock signal.
3. The information communication system of claim 2, wherein the phase  
25 controller alters a phase of the common reference clock signal for each of the plurality  
of information communication devices by the predetermined amount to alter the phase  
of each information communication clock signal of each of the plurality of  
information communication devices by the predetermined amount.
- 30 4. The information communication system of claim 1, comprising:

a reference clock signal generator for generating the common reference clock signal.

5           5.       The information communication system of claim 1, wherein the phase controller alters the phase of each information communication clock signal of each of the plurality of information communication devices by a multiple of 90 degrees.

10           6.       The information communication system of claim 1, wherein the phase of at least two of the information communication clock signals are substantially identical, and  
              wherein a number of information communication clock signals with substantially identical phase is less than a total number of information communication clock signals of the information communication system.

15           7.       The information communication system of claim 1, wherein the phase controller comprises:  
              a phase locked loop; and  
              a signal division controller in communication with the phase locked loop,  
                  wherein the signal division controller is configured to control a start  
20       time of signal division of an output signal of the phase locked loop,  
              wherein the output signal is associated with the information communication clock signal, and  
              wherein the start time of signal division of the output signal is varied to alter the phase of each information communication clock signal of each of the  
25       plurality of information communication devices.

              8.       The information communication system of claim 1, wherein the phase controller comprises:  
              a plurality of time delay elements.

30           9.       The information communication system of claim 8, wherein the plurality of time delay elements comprises:

a plurality of delay locked loops.

10. The information communication system of claim 8, wherein the plurality of time delay elements are arranged in cascade, and

5 wherein each of the plurality of information communication devices is in communication with at least one of the plurality of time delay elements.

11. The information communication system of claim 8, wherein the phase controller further comprises:

10 at least one delay locked loop,

wherein the at least one delay locked loop is in communication with each of the plurality of information communication devices via an information communication channel, and

15 wherein each information communication channel includes at least one of the plurality of time delay elements.

12. The information communication system of claim 1, wherein the information communication system comprises an Ethernet transceiver.

20 13. The information communication system of claim 12, wherein the Ethernet transceiver is compliant with I.E.E.E. 802.3ab.

14. An information communication system, comprising:

a plurality of information communication means,

25 wherein each of the plurality of information communication means is responsive to a respective information communication clock signal, and

wherein each information communication clock signal of each of the plurality of information communication means is associated with a common reference clock signal; and

30 phase controller means,

wherein the phase controller means is responsive to the common reference clock signal, and

wherein the phase controller means alters a phase of each information communication clock signal of each of the plurality of information communication means by a predetermined amount.

5           15.    The information communication system of claim 14, wherein each of the plurality of information communication means is responsive to the common reference clock signal altered by the phase controller means, and  
              wherein each of the plurality of information communication means comprises:  
                  means for generating the respective information communication clock  
10   signal using the common reference clock signal.

              16.    The information communication system of claim 15, wherein the phase controller means alters a phase of the common reference clock signal for each of the plurality of information communication means by the predetermined amount to alter  
15   the phase of each information communication clock signal of each of the plurality of information communication means by the predetermined amount.

              17.    The information communication system of claim 14, comprising:  
                  means for generating the common reference clock signal.

20

              18.    The information communication system of claim 14, wherein the phase controller means alters the phase of each information communication clock signal of each of the plurality of information communication means by a multiple of 90 degrees.

25

              19.    The information communication system of claim 14, wherein the phase of at least two of the information communication clock signals are substantially identical,

              wherein a number of information communication clock signals with  
30   substantially identical phase is less than a total number of information communication clock signals of the information communication system.

20. The information communication system of claim 14, wherein the phase controller means comprises:

a phase locked loop means; and

5 a signal division controller means in communication with the phase locked loop means,

wherein the signal division controller means is configured to control a start time of signal division of an output signal of the phase locked loop means,

wherein the output signal is associated with the information communication clock signal, and

10 wherein the start time of signal division of the output signal is varied to alter the phase of each information communication clock signal of each of the plurality of information communication means.

21. The information communication system of claim 14, wherein the phase controller means comprises:

15 a plurality of time delay means.

22. The information communication system of claim 21, wherein the plurality of time delay means comprises:

20 a plurality of delay locked loop means.

23. The information communication system of claim 21, wherein the plurality of time delay means are arranged in cascade, and

25 wherein each of the plurality of information communication means is in communication with at least one of the plurality of time delay means.

24. The information communication system of claim 21, wherein the phase controller means further comprises:

at least one delay locked loop means,

30 wherein the at least one delay locked loop means is in communication with each of the plurality of information communication means via an information communication channel means, and

wherein each information communication channel means includes at least one of the plurality of time delay means.

25. The information communication system of claim 14, wherein the  
5 information communication system comprises an Ethernet transceiver means.

26. The information communication system of claim 25, wherein the Ethernet transceiver means is compliant with I.E.E.E. 802.3ab.

10 27. A method of controlling phase of clock signals among a plurality of information communication devices of an information communication system, comprising the steps of:

generating an information communication clock signal in each of the plurality of information communication devices,

15 wherein each information communication clock signal of each of the plurality of information communication devices is associated with a common reference clock signal; and

altering a phase of each information communication clock signal for each of the plurality of information communication devices by a predetermined amount.

20

28. The method of claim 27, further comprising the steps of:

receiving the common reference clock signal in each of the plurality of information communication devices.

25 29. The method of claim 28, wherein the step of generating an information communication clock signal comprises the step of:

generating each information communication clock signal for each of the plurality of information communication devices using the common reference clock signal.

30

30. The method of claim 29, wherein the step of altering comprises the step of:

altering a phase of the common reference clock signal for each of the plurality of information communication devices by the predetermined amount to alter the phase of each information communication clock signal of each of the plurality of information communication devices by the predetermined amount.

5

31. The method of claim 30, wherein the step of altering the phase of the common reference clock signal comprises the step of:

time delaying the common reference clock signal supplied to each of the plurality of information communication devices by the predetermined amount.

10

32. The method of claim 27, comprising the step of:  
generating the common reference clock signal.

33. The method of claim 27, wherein the step of altering comprises the  
15 step of:

altering the phase of each information communication clock signal of each of the plurality of information communication devices by a multiple of 90 degrees.

34. The method of claim 27, wherein the step of altering comprises the  
20 steps of:

controlling a start time of signal division of an output signal of a phase locked loop,

wherein the output signal is associated with the information communication clock signal; and

25 varying the start time of signal division of the output signal to alter the phase of each information communication clock signal of each of the plurality of information communication devices.

35. The method of claim 27, wherein the phase of at least two of the  
30 information communication clock signals are substantially identical,

wherein a number of information communication clock signals with substantially identical phase is less than a total number of information communication clock signals of the information communication system.

5           36.     The method of claim 27, wherein the method is compliant with I.E.E.E. 802.3ab.

          37.     An information communication system, comprising:  
          a plurality of information communication devices,  
10                 wherein each of the plurality of information communication devices is responsive to a respective information communication clock signal,  
                      wherein each of the plurality of information communication devices is responsive to a common reference clock signal, and  
                      wherein the information communication clock signal of each of the  
15           plurality of information communication devices is associated with the common reference clock signal; and  
          a phase controller,  
                      wherein the phase controller is responsive to the common reference clock signal, and  
20                 wherein the phase controller alters a phase of the common reference clock signal for each of the plurality of information communication devices by a predetermined amount to alter a phase of each information communication clock signal of each of the plurality of information communication devices by the predetermined amount.

25           38.     The information communication system of claim 37, wherein each of the plurality of information communication devices comprises:  
          a device clock for generating the respective information communication clock signal using the common reference clock signal altered by the phase controller.

30           39.     The information communication system of claim 37, comprising:



a reference clock signal generator for generating the common reference clock signal.

40. The information communication system of claim 37, wherein the phase  
5 controller alters the phase of each information communication clock signal of each of the plurality of information communication devices by a multiple of 90 degrees.

41. The information communication system of claim 37, wherein the phase  
of at least two of the information communication clock signals are substantially  
10 identical, and

wherein a number of information communication clock signals with substantially identical phase is less than a total number of information communication clock signals of the information communication system.

42. The information communication system of claim 37, wherein the phase  
15 controller comprises:  
a plurality of time delay elements.

43. The information communication system of claim 42, wherein the  
20 plurality of time delay elements comprises:  
a plurality of delay locked loops.

44. The information communication system of claim 42, wherein the  
plurality of time delay elements are arranged in cascade, and  
25 wherein each of the plurality of information communication devices is in communication with at least one of the plurality of time delay elements.

45. The information communication system of claim 42, wherein the phase  
controller further comprises:  
30 at least one delay locked loop,

wherein the at least one delay locked loop is in communication with each of the plurality of information communication devices via an information communication channel, and

5 wherein each information communication channel includes at least one of the plurality of time delay elements.

46. The information communication system of claim 37, wherein the information communication system comprises an Ethernet transceiver.

10 47. The information communication system of claim 46, wherein the Ethernet transceiver is compliant with I.E.E.E. 802.3ab.

48. An information communication system, comprising:  
a plurality of information communication means,  
15 wherein each of the plurality of information communication means is responsive to a respective information communication clock signal,  
wherein each of the plurality of information communication means is responsive to a common reference clock signal, and  
wherein each information communication clock signal of each of the  
20 plurality of information communication means is associated with the common reference clock signal; and  
phase controller means,  
wherein the phase controller means is responsive to the common reference clock signal, and  
25 wherein the phase controller means alters a phase of the common reference clock signal for each of the plurality of information communication means by a predetermined amount to alter a phase of each information communication clock signal of each of the plurality of information communication means by the predetermined amount.

30 49. The information communication system of claim 48, wherein each of the plurality of information communication means comprises:

means for generating the respective information communication clock signal using the common reference clock signal altered by the phase controller means.

5           50.     The information communication system of claim 48, comprising:  
            means for generating the common reference clock signal.

10           51.     The information communication system of claim 48, wherein the phase controller means alters the phase of each information communication clock signal of each of the plurality of information communication means by a multiple of 90 degrees.

            52.     The information communication system of claim 48, wherein the phase of at least two of the information communication clock signals are substantially identical, and  
15           wherein a number of information communication clock signals with substantially identical phase is less than a total number of information communication clock signals of the information communication system.

20           53.     The information communication system of claim 48, wherein the phase controller means comprises:  
            a plurality of time delay means.

            54.     The information communication system of claim 53, wherein the plurality of time delay means comprises:  
25           a plurality of delay locked loop means.

            55.     The information communication system of claim 53, wherein the plurality of time delay means are arranged in cascade, and  
            wherein each of the plurality of information communication means is in  
30           communication with at least one of the plurality of time delay means.

56. The information communication system of claim 53, wherein the phase controller means further comprises:

at least one delay locked loop means,

5 wherein the at least one delay locked loop means is in communication with each of the plurality of information communication means via an information communication channel means, and

wherein each information communication channel means includes at least one of the plurality of time delay means.

10 57. The information communication system of claim 48, wherein the information communication system comprises an Ethernet transceiver means.

58. The information communication system of claim 57, wherein the Ethernet transceiver means is compliant with I.E.E.E. 802.3ab.

15 59. A method of controlling phase of clock signals among a plurality of information communication devices of an information communication system, comprising the steps of:

receiving a common reference clock signal,

20 wherein each of the plurality of information communication devices is responsive to the common reference clock signal;

altering a phase of the common reference clock signal for each of the plurality of information communication devices by a predetermined amount; and

25 generating an information communication clock signal for each of the plurality of information communication devices using the respective phase-altered common reference clock signal,

wherein a phase of each information communication clock signal of each of the plurality of information communication devices is altered by the predetermined amount.

30 60. The method of claim 59, wherein the step of altering comprises the step of:

time delaying the common reference clock signal supplied to each of the plurality of information communication devices by the predetermined amount.

5           61.     The method of claim 59, comprising the step of:  
generating the common reference clock signal.

          62.     The method of claim 59, wherein the step of altering comprises the  
step of:  
          altering the phase of each information communication clock signal of each of  
10   the plurality of information communication devices by a multiple of 90 degrees.

          63.     The method of claim 59, wherein the phase of at least two of the  
information communication signals are substantially identical, and  
          wherein a number of information communication clock signals with  
15   substantially identical phase is less than a total number of information communication  
clock signals of the information communication system.

          64.     The method of claim 59, wherein the method is compliant with  
I.E.E.E. 802.3ab.

20

          65.     A multi-port network device compliant with I.E.E.E. 802.3ab,  
comprising:

          a plurality of transceivers, wherein each of the plurality of transceivers  
comprises:

25

          a plurality of information communication devices,  
          wherein each of the plurality of information communication  
devices is responsive to a respective information communication clock signal, and  
          wherein each information communication clock signal of each  
of the plurality of information communication devices is associated with a common  
30   reference clock signal; and

          a phase controller,

wherein the phase controller is responsive to the common reference clock signal, and

wherein the phase controller alters a phase of each information communication clock signal of each of the plurality of information communication devices by a predetermined amount.

66. The multi-port network device of claim 65, wherein each of the plurality of information communication devices is responsive to the common reference clock signal altered by the phase controller, and

wherein each of the plurality of information communication devices comprises:

a device clock for generating the respective information communication clock signal using the common reference clock signal.

67. The multi-port network device of claim 66, wherein the phase controller alters a phase of the common reference clock signal for each of the plurality of information communication devices by the predetermined amount to alter the phase of each information communication clock signal of each of the plurality of information communication devices by the predetermined amount.

68. The multi-port network device of claim 65, comprising:  
a reference clock signal generator for generating the common reference clock signal.

69. The multi-port network device of claim 65, wherein the phase controller alters the phase of each information communication clock signal of each of the plurality of information communication devices by a multiple of 90 degrees.

70. The multi-port network device of claim 65, wherein the phase of at least two of the information communication clock signals are substantially identical, and

wherein a number of information communication clock signals with substantially identical phase is less than a total number of information communication clock signals of the multi-port network device.

5           71.     The multi-port network device of claim 65, wherein the phase controller comprises:  
              a phase locked loop; and  
              a signal division controller in communication with the phase locked loop,  
                      wherein the signal division controller is configured to control a start  
10     time of signal division of an output signal of the phase locked loop,  
                      wherein the output signal is associated with the information communication clock signal, and  
                      wherein the start time of signal division of the output signal is varied to  
              alter the phase of each information communication clock signal of each of the  
15     plurality of information communication devices.

              72.     The multi-port network device of claim 65, wherein the phase controller comprises:  
              a plurality of time delay elements.

20

              73.     The multi-port network device of claim 72, wherein the plurality of time delay elements comprises:  
              a plurality of delay locked loops.

25           74.     The multi-port network device of claim 72, wherein the plurality of time delay elements are arranged in cascade, and  
                      wherein each of the plurality of information communication devices is in communication with at least one of the plurality of time delay elements.

30           75.     The multi-port network device of claim 72, wherein the phase controller further comprises:  
              at least one delay locked loop,

wherein the at least one delay locked loop is in communication with each of the plurality of information communication devices via an information communication channel, and

5 wherein each information communication channel includes at least one of the plurality of time delay elements.

76. The multi-port network device of claim 65, wherein the plurality of transceivers comprise one of four and eight.

10 77. The multi-port network device of claim 65, wherein each of the plurality of transceivers comprises an Ethernet transceiver.

78. A multi-port network device compliant with I.E.E.E. 802.3ab, comprising:

15 a plurality of transceiver means, wherein each of the plurality of transceiver means comprises:

a plurality of information communication means,

wherein each of the plurality of information communication means is responsive to a respective information communication clock signal, and

20 wherein each information communication clock signal of each of the plurality of information communication means is associated with a common reference clock signal; and

phase controller means,

25 wherein the phase controller means is responsive to the common reference clock signal, and

wherein the phase controller means alters a phase of each information communication clock signal of each of the plurality of information communication means by a predetermined amount.

30 79. The multi-port network device of claim 78, wherein each of the plurality of information communication means is responsive to the common reference clock signal altered by the phase controller means, and



wherein each of the plurality of information communication means comprises:  
means for generating the respective information communication clock  
signal using the common reference clock signal.

5           80.     The multi-port network device of claim 79, wherein the phase  
controller means alters a phase of the common reference clock signal for each of the  
plurality of information communication means by the predetermined amount to alter  
the phase of each information communication clock signal of each of the plurality of  
information communication means by the predetermined amount.

10

81.     The multi-port network device of claim 78, comprising:  
means for generating the common reference clock signal.

82.     The multi-port network device of claim 78, wherein the phase  
15 controller means alters the phase of each information communication clock signal of  
each of the plurality of information communication means by a multiple of 90  
degrees.

83.     The multi-port network device of claim 78, wherein the phase of at  
20 least two of the information communication clock signals are substantially identical,  
wherein a number of information communication clock signals with  
substantially identical phase is less than a total number of information communication  
clock signals of the multi-port network device.

84.     The multi-port network device of claim 78, wherein the phase  
25 controller means comprises:  
a phase locked loop means; and  
a signal division controller means in communication with the phase locked  
loop means,  
30 wherein the signal division controller means is configured to control a  
start time of signal division of an output signal of the phase locked loop means,

wherein the output signal is associated with the information  
communication clock signal, and

wherein the start time of signal division of the output signal is varied to  
alter the phase of each information communication clock signal of each of the  
5 plurality of information communication means.

85. The multi-port network device of claim 78, wherein the phase  
controller means comprises:

a plurality of time delay means.

10

86. The multi-port network device of claim 85, wherein the plurality of  
time delay means comprises:

a plurality of delay locked loop means.

87. The multi-port network device of claim 85, wherein the plurality of  
time delay means are arranged in cascade, and  
wherein each of the plurality of information communication means is in  
communication with at least one of the plurality of time delay means.

88. The multi-port network device of claim 85, wherein the phase  
controller means further comprises:

at least one delay locked loop means,

wherein the at least one delay locked loop means is in communication  
with each of the plurality of information communication means via an information

25 communication channel means, and

wherein each information communication channel means includes at  
least one of the plurality of time delay means.

89. The multi-port network device of claim 78, wherein the plurality of  
30 transceiver means comprise one of four and eight.

90. The multi-port network device of claim 89, wherein each of the plurality of transceiver means comprises an Ethernet transceiver means.

91. An information communication system, comprising:  
5 a reference clock signal generator for generating a common reference clock signal;  
a plurality of information communication devices,  
wherein each of the plurality of information communication devices is responsive to the common reference clock signal,  
10 wherein each of the plurality of information communication devices is responsive to a respective information communication clock signal,  
wherein each information communication clock signal of each of the plurality of information communication devices is associated with the common reference clock signal; and  
15 a phase controller,  
wherein the phase controller is responsive to the common reference clock signal,  
wherein the phase controller alters a phase of each information communication clock signal of each of the plurality of information communication  
20 devices by a predetermined amount, and  
wherein each of the plurality of information communication devices comprises:  
a device clock for generating the respective information communication clock signal using the common reference clock signal altered by the  
25 phase controller.

92. The information communication system of claim 91, wherein the phase controller alters a phase of the common reference clock signal for each of the plurality of information communication devices by the predetermined amount to alter the phase  
30 of each information communication clock signal of each of the plurality of information communication devices by the predetermined amount.

93. The information communication system of claim 91, wherein the phase controller alters the phase of each information communication clock signal of each of the plurality of information communication devices by a multiple of 90 degrees.

5 94. The information communication system of claim 91, wherein the phase of at least two of the information communication clock signals are substantially identical, and

wherein a number of information communication clock signals with substantially identical phase is less than a total number of information communication  
10 clock signals of the information communication system.

95. The information communication system of claim 91, wherein the phase controller comprises:

a phase locked loop; and

15 a signal division controller in communication with the phase locked loop, wherein the signal division controller is configured to control a start time of signal division of an output signal of the phase locked loop,

wherein the output signal is associated with the information communication clock signal, and

20 wherein the start time of signal division of the output signal is varied to alter the phase of each information communication clock signal of each of the plurality of information communication devices.

96. The information communication system of claim 91, wherein the phase  
25 controller comprises:

a plurality of time delay elements.

97. The information communication system of claim 96, wherein the plurality of time delay elements comprises:

30 a plurality of delay locked loops.

98. The information communication system of claim 96, wherein the plurality of time delay elements are arranged in cascade, and wherein each of the plurality of information communication devices is in communication with at least one of the plurality of time delay elements.

5

99. The information communication system of claim 96, wherein the phase controller further comprises:

at least one delay locked loop,

10 wherein the at least one delay locked loop is in communication with each of the plurality of information communication devices via an information communication channel, and

wherein each information communication channel includes at least one of the plurality of time delay elements.

15 100. An information communication system, comprising:  
means for generating a common reference clock signal;  
a plurality of information communication means,

wherein each of the plurality of information communication means is responsive to the common reference clock signal,

20 wherein each of the plurality of information communication means is responsive to a respective information communication clock signal,

wherein each information communication clock signal of each of the plurality of information communication means is associated with the common reference clock signal; and

25 means for controlling phase,

wherein the means for controlling phase is responsive to the common reference clock signal,

30 wherein the means for controlling phase alters a phase of each information communication clock signal of each of the plurality of information communication means by a predetermined amount, and

wherein each of the plurality of information communication means comprises:

means for generating the respective information  
communication clock signal using the common reference clock signal altered by the  
means for controlling phase.

5           101. The information communication system of claim 100, wherein the  
means for controlling phase alters a phase of the common reference clock signal for  
each of the plurality of information communication means by the predetermined  
amount to alter the phase of each information communication clock signal of each of  
the plurality of information communication means by the predetermined amount.

10

          102. The information communication system of claim 100, wherein the  
means for controlling phase alters the phase of each information communication clock  
signal of each of the plurality of information communication means by a multiple of  
90 degrees.

15

          103. The information communication system of claim 100, wherein the  
phase of at least two of the information communication clock signals are substantially  
identical, and

          wherein a number of information communication clock signals with  
20 substantially identical phase is less than a total number of information communication  
clock signals of the information communication system.

          104. The information communication system of claim 100, wherein the  
means for controlling phase comprises:

25           a phase locked loop means; and

          means for controlling signal division in communication with the phase locked  
loop means,

          wherein the means for controlling signal division is configured to  
control a start time of signal division of an output signal of the phase locked loop  
30 means,

          wherein the output signal is associated with the information  
communication clock signal, and

wherein the start time of signal division of the output signal is varied to alter the phase of each information communication clock signal of each of the plurality of information communication means.

5           105.   The information communication system of claim 100, wherein the means for controlling phase comprises:  
              a plurality of time delay means.

10           106.   The information communication system of claim 105, wherein the plurality of time delay means comprises:  
              a plurality of delay locked loop means.

15           107.   The information communication system of claim 105, wherein the plurality of time delay means are arranged in cascade, and  
              wherein each of the plurality of information communication means is in communication with at least one of the plurality of time delay means.

20           108.   The information communication system of claim 105, wherein the means for controlling phase further comprises:  
              at least one delay locked loop means,  
                      wherein the at least one delay locked loop means is in communication with each of the plurality of information communication means via an information communication channel, and  
                      wherein each information communication channel includes at least one  
25           of the plurality of time delay means.